

IN THE CLAIMS:

U.S. Claims

1. A loudspeaker, comprising:

a back plate;

a frame coupled to the back plate;

a driver coupled to the frame, the driver being responsive to an electrical signal;

an enhancer having a neck and a mouth, the neck being coupled to the driver, the enhancer being movable in accordance with the movement of the driver; and

a membrane coupled to the mouth of the enhancer, the membrane supported and maintained taut by the frame.

2. The loudspeaker in accordance with claim 1 wherein the driver is coupled to the frame by support of the back plate.

3. The loudspeaker in accordance with claim 1 wherein the enhancer has a shape that is at least one of frustoconical shape, parabolic shape and bell shape.

4. The loudspeaker in accordance with claim 1 wherein the thickness of the speaker, including the frame and the back plate, is less than about 30mm.

5. The loudspeaker in accordance with claim 1 wherein the membrane has a section

spanning across a space defined by the frame, wherein the section is homogeneous in thickness and material.

6. The loudspeaker in accordance with claim 1 wherein the membrane is made of a flexible and substantially non-elastic material.

7. The loudspeaker in accordance with claim 6 wherein the membrane is uniformly tensioned to about 5 to 30 pounds.

8. The loudspeaker in accordance with claim 1, wherein the membrane is maintained taut under tension in its plane.

9. The loudspeaker in accordance with claim 1 wherein the membrane is made of at least one of:

Kapton material;

Teonex material;

a polyimide material; and

a metal foil material.

10. The loudspeaker in accordance with claim 1 wherein small holes are provided on the membrane at locations near the frame.

11. The loudspeaker in accordance with claim 1 wherein the membrane has a thickness

such that the membrane that is attached to the frame is flexible and durable to endure vibrational forces of the driver without appreciable stretching.

12. The loudspeaker in accordance with claim 1 wherein magnetic oil is used in the driver to dampen resonance arising from the membrane.

13. The loudspeaker in accordance with claim 1 wherein the aspect ratio of diameter of the mouth to thickness of the enhancer measured from the neck to the mouth ranges from about 3:1 to 20:1.

14. The loudspeaker in accordance with claim 13 wherein the aspect ratio of diameter of the mouth to thickness of the enhancer measured from the neck to the mouth ranges from about 8:1 to 13:1.

15. The loudspeaker in accordance with claim 1 wherein the ratio of diameter of the neck to diameter of the mouth of the enhancer ranges from about 3:5 to 3:4.

16. The loudspeaker in accordance with claim 2 wherein the back plate has a recess, wherein the driver is received in the recess in the back plate.

17. The loudspeaker in accordance with claim 16 wherein the recess is off-center with respect to the frame.

18. The loudspeaker in accordance with claim 2 wherein the back plate has a recess that receives a yoke in which a magnet and a voice coil is disposed.

19. The loudspeaker in accordance with claim 1 wherein apertures are provided in the back plate.

20. The loudspeaker in accordance with claim 19 wherein the back plate comprises a screen.

21. The loudspeaker in accordance with claim 1 wherein the enhancer is made of a fiber-reinforced paper composite.

22. The loudspeaker in accordance with claim 21 wherein about 20% to 30% of the enhancer is made of Kevlar material.

23. The loudspeaker in accordance with claim 22 wherein the membrane is adhered to at least one of the enhancer and the frame by using a rubber type adhesive that is capable of dampening resonance.

24. The loudspeaker in accordance with claim 1 further comprising a clamp, wherein the membrane is secured in between the clamp and the frame.

25. The loudspeaker in accordance with claim 24 wherein the clamp has an inner

textured surface.

26. The loudspeaker in accordance with claim 24 wherein the clamp is made of an elastic material.

27. The loudspeaker in accordance with claim 24 wherein the frame has a tapered outer surface, wherein the clamp has an inner surface that corresponds to the tapered outer surface of the frame, whereby when the clamp is applied to the frame, the membrane is tightly secured between the frame and the clamp.

28. The loudspeaker in accordance with claim 1 wherein the thin film membrane has a hole and the membrane is coupled to the enhancer such that the hole corresponds in size and location with the mouth of the enhancer.